

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte J. YONG RYU, LAWRENCE A. SMITH, JR. ,
ABRAHAM P. GELBEIN and FRITS DAUTZENBERG

Appeal No. 2004-1644
Application No. 10/071,341

ON BRIEF

Before KIMLIN, OWENS and JEFFREY T. SMITH, *Administrative Patent Judges*.

JEFFREY T. SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal the decision of the Primary Examiner finally rejecting claims 1-5, 7 and 8.¹ We have jurisdiction under 35 U.S.C. § 134.²

¹ According to Appellants, claims 4 and 5 have been withdrawn from appeal. (Brief, p. 2).

² In rendering this decision, we have considered Appellants' arguments presented in the Brief filed January 23, 2004 and the Reply Brief filed April 30, 2004.

BACKGROUND

Appellants' invention relates to a process for the conversion of mixed C₄, C₅ alkane streams which are useful for the formation of motor fuel. (Brief, pp. 2-3). The scope of Appellants' invention can be ascertained from representative claim 1, which is reproduced below.

1. A process for upgrading a C₄, C₅ or mixed stream thereof comprising normal alkane and isoalkane to motor fuel comprising the steps of:

- (a) separating the isoalkane from the normal alkane;
- (b) subjecting a portion of the separated normal alkane to dehydrogenation in a dehydrogenation unit to produce a normal alkenes and dienes as an effluent;
- (c) selectively hydrogenating the effluent from (b) under conditions to selectively hydrogenate said dienes; and
- (d) feeding the separated isoalkane and the normal alkenes to an alkylation unit where the isoalkane is reacted with the normal alkenes to form a branched alkane.

CITED PRIOR ART

As evidence of unpatentability, the Examiner relies on the following prior art:

Allender	2,314,435	Mar. 23, 1943
Vora	4,520,214	May 28, 1985

The Examiner rejected claims 1-3, 7 and 8 under 35 U.S.C. § 103(a) as obvious over the combination of Allender and Vora. (Answer, pp. 3-4).

We have carefully reviewed the claims, specification and applied prior art, including all of the arguments advanced by both the Examiner and Appellants in support of their respective positions. This review leads us to conclude that the Examiner's § 103 rejection is well founded. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1471-1472, 223 USPQ 785, 787-788 (Fed. Cir. 1984). We affirm primarily for the reasons advanced by the Examiner and add the following primarily for emphasis.

DISCUSSION³

Rather than reiterate the conflicting viewpoints advanced by the Examiner and Appellants concerning the above-noted rejections, we refer to the Answer and the Briefs.

The Examiner has found that Allender describes a process for upgrading hydrocarbons, including alkane streams comprising C₄ alkanes. (Answer, p. 3). The process comprises separating isoalkane from normal alkane, dehydrogenation

³ Appellants have indicated (Brief, p. 3) that, for the purposes of this appeal, the claims 1-3, 7 and 8 stand or fall together. Accordingly, all of the claims will stand or fall together and we will limit our consideration to claim 1. See 37 CFR § 1.192(c)(7)(2003).

of the separated normal alkane and alkylation of the isoalkane and the normal alkane product from the dehydrogenation. The process of Allender does not include a hydrogenation step for some of the product produced during dehydrogenation. The Examiner has also found that Vora describes hydrocarbon processing comprising a process for hydrogenating some of the product produced during dehydrogenation. (Answer, p. 3). Vora also discloses that persons of ordinary skill in the art would have recognized that diolefin byproducts (dienes) are present in the product resulting from dehydrogenation of hydrocarbon streams. (Col. 1). Vora discloses that the selective hydrogenation of the diolefin hydrocarbon product of dehydrogenation converts a substantial amount of diolefinic hydrocarbon to monoolefinic hydrocarbon, which is the desired product of the dehydrogenation unit, i.e., increased quality of the monoolefin product. (Col. 5). The Examiner concluded that it would have been obvious to incorporate an hydrogenation process for the product from a dehydrogenation unit, such as described in Allender, in order reduce undesirable diolefin byproducts resulting from the dehydrogenation zone and increase the monoolefinic hydrocarbon, which is the desired product of the dehydrogenation unit. (Answer, p. 4).

Appellants argue that the proposed combination of references does not result in the claimed invention because Vora discloses an in-situ hydrogenation process

that occurs in the dehydrogenation zone. However, “the present claims all recite that the effluent from dehydrogenation is treated to selectively hydrogenate said dienes.” (Brief, p. 4). Further, Appellants argue “[t]he selective hydrogenation of applicants’ invention [shown in the FIGURE] is located outside the block 2 [the dehydrogenation zone] in the block designated by the reference numeral 4 which is after the stripper or dehydrogenation zone of Vora.” (Reply Brief, p. 2).

Appellants’ arguments are not persuasive. The process of hydrogenation in the present invention, like that of Vora, is performed on the product produced from the dehydrogenation unit/reactor. (Specification, p. 2; Vora, col. 5). Thus, we agree with the Examiner, Answer page 4, that Vora hydrogenates the effluent resulting from the dehydrogenation reactor.

Appellants argue that there is no suggestion to combine the teachings of Allender and Vora. (Brief, p. 5). We do not agree. We note that Appellants have not disputed the Examiner’s determination that diolefins in the alkylation feed stream are undesirable. (See Briefs generally). A person of ordinary skill in the art would have reasonably expected that the incorporation of an hydrogenation process for the product resulting from the dehydrogenation reactor in the process of Allender would result in increased monoolefinic hydrocarbon and reduced

Appeal No. 2004-1644
Application No. 10/071,341

undesirable diolefin byproducts that would have subsequently been subject to alkylation.

Appellants argue that the only evidence of record that recognizes that diolefins are undesirable in the claimed reaction is the Appellants' disclosure. (Reply Brief, p. 2). This argument is not persuasive. A person of ordinary skill in the art would have recognized that diolefins interfere with an alkylation reaction. (See Vora, col. 1, ll. 43-63).


Based on our consideration of the totality of the record before us, having evaluated the *prima facie* case of obviousness in view of Appellants' arguments, we conclude that the subject matter of claims 1-3, 7 and 8 would have been obvious to a person of ordinary skill in the art from the combined teachings of the cited prior art for the reasons stated above and in the Answer.

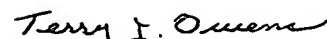
Appeal No. 2004-1644
Application No. 10/071,341


Time for taking action

No time period for taking any subsequent action in connection with this
appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED


EDWARD C. KIMLIN
Administrative Patent Judge


TERRY J. OWENS
Administrative Patent Judge


JEFFREY T. SMITH
Administrative Patent Judge

)
)
)
)
)
)
) **BOARD OF PATENT**
) **APPEALS**
) **AND**
) **INTERFERENCES**
)
)
)
)

JTS/gjh

Appeal No. 2004-1644
Application No. 10/071,341

KENNETH H. JOHNSON
P.O. BOX 630708
HOUSTON, TX 77263-0000